ABSTRACT OF THE DISCLOSURE

A fuel cell system calculates a water quantity Qw produced by a fuel cell from an output current I of the fuel cell, and at the same time calculates saturated water vapor contents Qwa and Qwc in exhaust gases based on exhaust-gas flow rates Qa and Qc, exhaust-gas pressures Pa and Pc, and exhaust-gas temperatures Ta and Tc of the anode side and the cathode side, respectively. Then the system calculates a water quantity control ratio that is defined as $t = Qw / (Qwa + Qwc)$ and controls operation of the fuel cell by controlling one or more of the exhaust-gas flow rates Qa and Qc, the exhaust-gas pressures Pa and Pc, the exhaust-gas temperatures Ta and Tc, and a current I of the anode side and the cathode side in a direction such that a deviation Δt between the water quantity control ratio t and a value of one is canceled out. By this control, the fuel cell can be operated with excellent performance, without humidifying gases of the anode side and the cathode side.